Scoping Notice: Thompson Meadow Restoration Project

Introduction

The USDA Forest Service, Plumas National Forest, Beckwourth Ranger District proposes activities to restore 40 acres of currently degraded meadow along a 0.6 mile reach of Thompson Creek. The stream channel is currently deeply incised to depths of 4 to 10 feet, resulting in steep, eroding channel banks, depleted groundwater storage, and conversion of the historic meadow vegetation to a xeric, sagebrush-dominated landscape. The primary goals of the project are restoration of historic floodplain function and restoration of the historic meadow water table elevation. Flood flows are currently confined to the incised channel. Streambank erosion is expected to be reduced by spreading flood flows outside of the channel, reducing flow stresses on the banks. Restoration of the water table is expected to restore meadow vegetation communities by allowing plant roots to reach the water table throughout much of the growing season. The current incised channel acts as a drain for meadow moisture, so water table restoration is expected to enhance groundwater storage in the meadow. Wildlife habitat and grazing forage are expected to improve. Thompson Creek is a tributary to McReynolds Creek, which flows to Red Clover Creek in northeastern Plumas County. All of the areas proposed for treatment are located on National Forest System lands (Figure 1).

Through a partnership with State of California Department of Water Resources (CA-DWR), this project includes a robust surface and groundwater monitoring program to better understand the hydrologic effects of restoring degraded meadows in the Sierra Nevada. CA-DWR has installed monitoring equipment to thoroughly evaluate changes in streamflow entering and leaving the meadow before and after restoration. This monitoring network includes stream flow gages, groundwater measurement wells, soil moisture sensors, a weather station, and an evapotranspiration measurement station. Pre-project hydrologic and climate data have been collected continuously since 2012. Post-project hydrologic monitoring is planned to continue for 5 years following project construction, with CA-DWR then modeling the project effects. Project monitoring also includes pre- and post-implementation surveys of avian, terrestrial, and aquatic wildlife, as well as vegetation mapping.

Construction design for the project will be performed by a team of CA-DWR and US Forest Service engineers. Final approval of engineering plans and specifications will be performed by US Forest Service engineers. Conceptual design elements have been reviewed by signatories of the Upper Feather River Watershed Roundtable. California Department of Fish and Wildlife grant funds from the Proposition 1 Watershed Restoration Grant Program have been secured to assist with the NEPA and CEQA environmental assessments for this project. The environmental assessment reports will be finalized by Plumas National Forest staff. The Beckwourth District Ranger will be the deciding official for the treatment alternative chosen.

This action is part of a broader resource management program, under the authority of the 1988 Plumas National Forest Land and Resource Management Plan (1988 PNF LRMP), as amended by the 2004 Sierra

Nevada Forest Plan Amendment (2004 SNFPA) Record of Decision (ROD). This action is consistent with the 1988 PNF LRMP management direction for range, riparian, and water resources in the Dotta Management Area 36. General direction in this Management Area includes expanding range productivity and improving water quality. Standards and guidelines for water in the Dotta Management Area include stabilizing stream channels in the Red Clover Creek watershed. In addition, this action meets the1988 PNF LRMP objectives of maintaining or improving water quality to protect beneficial uses and reducing sediment yields from watersheds in deteriorating condition.

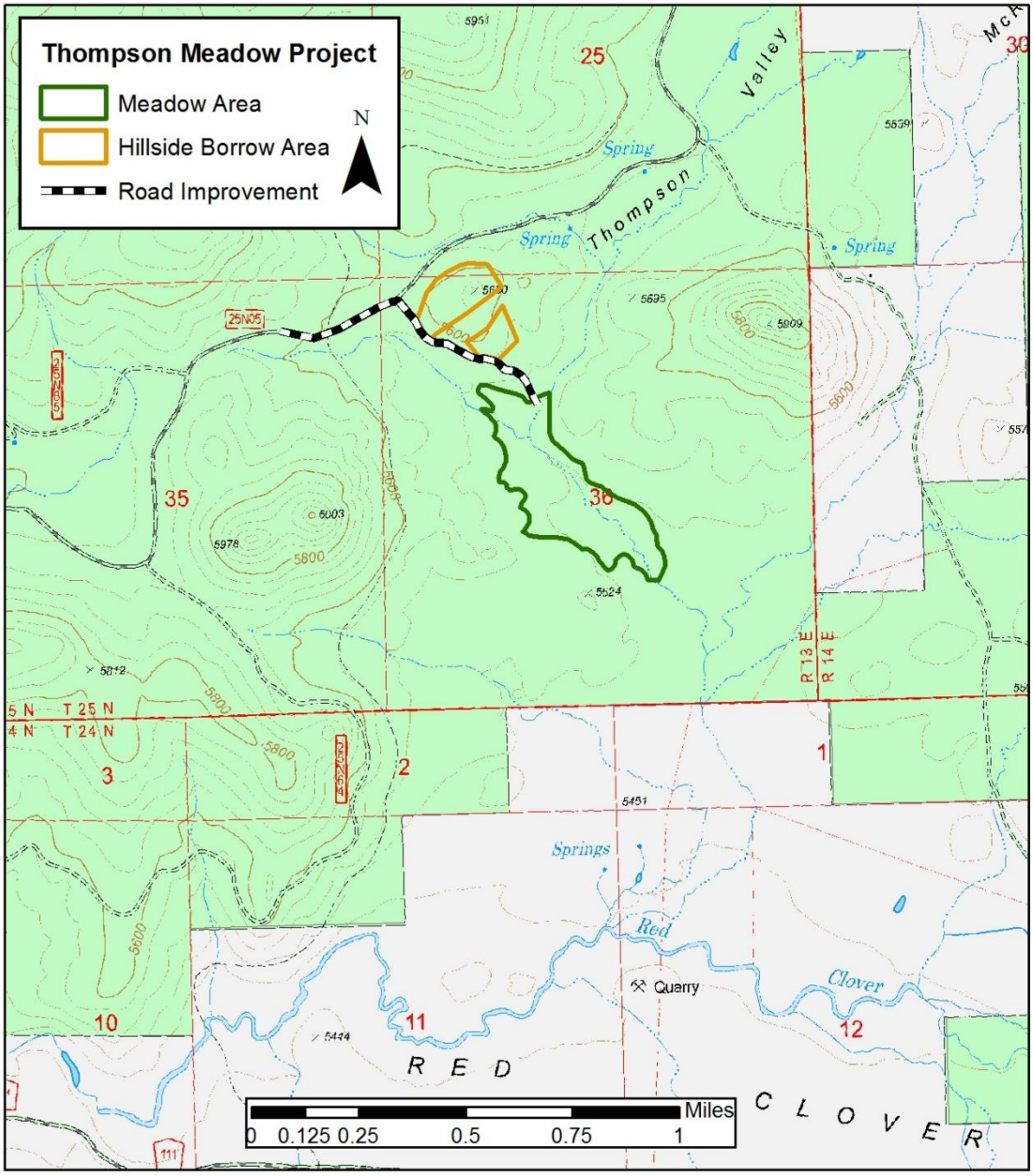

Figure 1: Project Area. Within section 36 of township 25N, range 13E**.** Thompson Creek is a tributary to McReynolds Creek, which flows to Red Clover Creek in northeastern Plumas County.

This action is also consistent with the Aquatic Management Strategy goals of the 2004 SNFPA, including restoration of stream banks, water quality, plant and animal community viability and diversity, habitat connectivity, and floodplain and water table connectivity. This action also meets the desired conditions of the riparian conservation areas such that streams and their riparian areas would be restored to their proper functioning condition. Finally, the proposed project alternatives are consistent with the Regional Forester's 2011 intent to increase the pace and scale of ecosystem restoration within the US Forest Service, Pacific Southwest Region.

Project Location

The Thompson Meadow Restoration Project is approximately 11 air miles north of Portola, CA in Plumas County, California. The project is located on National Forest System lands in the area designated in the Plumas National Forest Land and Resource Management Plan (PNF LRMP) as Dotta Management Area 36. The project is located in Section 36 of Township 25N, Range 13E (Figure 1).

Purpose and Need

Purpose: Restore channel/floodplain function to 0.6 miles of degraded stream channel and 40 acres of degraded meadow

Objective

The objective of the project is to restore the natural ecosystem function of the channel/floodplain system so that water flows in the channel can regularly spill out onto its naturally evolved meadow floodplain. Restoring floodplain function would stabilize eroding stream banks along Thompson Creek, improve water quality, and provide stable habitat conditions. Improved water quality, including reduced sedimentation and improved coldwater conditions, would benefit native and desired non-native aquatic wildlife species such as trout, speckled dace, aquatic snails and mussels.

Need for Action

There is a need to prevent further degradation of the stream and meadow system along Thompson Creek in order to improve low flow and peak flow conditions, meadow productivity, vegetative cover and water quality by preventing further bank erosion and providing stable stream channel structure. Currently, the stream channel for Thompson Creek is incised within the historic (pre-1850) meadow to a depth of 4 to 10 feet, with incised depths of more than 7 feet being most prevalent. This incision means that the stream channel has been cut off from its historic floodplain, particularly along the reaches that are incised over 7 feet. For these severely incised reaches, high energy flood flows are confined within the incision, causing vertical, highly eroded stream banks. This accelerated erosion during large floods has washed away willows, sedges, and other riparian vegetation that can stabilize stream banks and channel structure. Additionally, several headcuts exist within the meadow near where the west tributary enters Thompson Creek. Left untreated, these headcuts will continue to erode upstream and lower the water table in the western portion of the meadow.

Under the existing condition, it is unlikely that any but the most extreme flood events would allow the channel to overflow onto the historic meadow. Therefore, much of the soil and bank-building sediment materials are transported through the degraded channel, rather than deposited onto the floodplain. Transport of sediments through the channel reduces water quality downstream because of in-channel sedimentation. In addition, shallow groundwater flows have been altered due to the downcut channel and the lack of a fully developed floodplain. A functioning floodplain system acts like a sponge, keeping winter and spring runoff within the floodplain as groundwater through the summer months. This helps to maintain moist meadow vegetation later in the season.

Figure 2: The Thompson Creek channel is currently incised to depths of up to 10 feet, with steep, eroding stream banks. Looking downstream near the downstream end of the first proposed pond-and-plug reach. A portion of the incision to be completely filled is visible in the upper half of this photo. Thick sedge mats from the channel bottom would be transplanted on the surface of the complete fill.

Purpose: Improve the quality and quantity of woody and non-woody riparian vegetation along stream reaches that are in need of restoration

Objective

A second objective of the project is to restore native riparian plant communities, including woody species such as willow and non-woody species like sedges and grasses. Improved quality and quantity of riparian vegetation would benefit riparian dependent wildlife species such as small mammals, bats, willow flycatchers, and other meadow bird species. Improved riparian plant communities would also provide better forage for the grazing allotment that exists in the project area.

Need for Action

The incised stream channel has caused the historic meadow to dry out, leaving vast fields of sagebrush to dominate where meadow plant communities had once existed. This has caused a dramatic reduction in the quantity and quality of forage that was available to livestock prior to channel incision.

In addition, the unstable nature of Thompson Creek means that it is difficult for mature riparian vegetation communities to become established as the riparian vegetation that does develop within the incision is susceptible to erosion during large flood events. All of the following plant communities exist within the project area: riparian plant community, wet meadow plant community, moist meadow plant community, and dry meadow plant communities. Current conditions impede desirable plant communities from establishing throughout the project area. The treatments are proposed in order to increase the area of riparian and wet meadow plant communities. Restoring the historic flood plain conditions in areas that are currently dry would support these more desirable plant communities. The more desirable plant communities are more effective at keeping winter and spring runoff within the floodplain as groundwater through the summer months. The willows, sedges and rushes in these communities further support the project objectives by holding soil in place. Improved quality and quantity of riparian vegetation communities would benefit riparian-dependent wildlife species.

Figure 3: This large headcut currently exists on the Thompson Creek main stem, just upstream of the proposed grade control structure. Looking upstream. A series of rock raised riffle structures would be constructed in the channel shown in the upper half of this photo to raise the meadow water table and spread flood flows onto the meadow.

Summary of Existing Condition

- Rapidly eroding stream banks (with high, near-vertical banks)
- Headcut erosion along tributary stream in the southwestern portion of the meadow
- Inadequate riparian vegetation (only small areas of riparian vegetation, often immature and lacking important vegetation types)
- Stability and location of low flow channels are vulnerable to large floods
- Broad valleys have dried out (currently sagebrush-dominated whereas more diversity of habitat was present in recent history (pre-1850))

Summary of Desired Condition

Desired conditions are derived here from ecosystem strategies, goals, and standards presented in the Record of Decision (ROD) for the 2004 SNFPA, with the page number from the ROD cited in parentheses.

- Improved water quality, including cooler stream temperatures and reduced fine sediment (p. 42)
- Connection of floodplains with stream channels to distribute high energy flood flows and sustain diverse habitats (p. 43)
- Hydrologically functional meadows that filter and capture sediment (p. 43) and restore water tables (p. 63)
- Plant species composition and diversity in riparian areas and meadows provide desired habitat conditions and ecological functions (p. 43)
- Wildlife habitat supports viable populations of native and desired non-native riparian and aquatic dependent species (p. 42)
- Watershed conditions provide unobstructed movement for the survival, migration, and reproduction of aquatic dependent species (p. 43)

Project Alternatives

Alternative 1 (No-Action Alternative)

This alternative takes no action and serves as a baseline for comparison among the action alternatives. Under Alternative 1, no treatments would occur within Thompson Meadow so the existing conditions presented above under the "Need for Action" section would remain.

Alternative 2 (Proposed Action)

The Beckwourth Ranger District proposes to restore floodplain function and water table elevation over 0.6 mile of Thompson Creek within the 40-acre meadow. Treatments associated with Alternative 2 are shown on Figure 7. Proposed treatments under Alternative 2 would aim to raise the incised stream channel back to meadow elevation, thereby reducing streambank erosion by reconnecting the stream with historic floodplains that would dissipate the high energy associated with flood flows.

Treatment types include: 1. Fill the incision with a series of ponds and earthen plugs; 2. Completely fill a section of the channel incision; 3. Install raised riffle structures; 4. Construct a grade control structure; and 5. Headcut control on tributary channels. Additional treatments proposed include transplanting willows, sowing native plant seeds, installing exclosure fencing, and improving the meadow access road.

Fill the incision with a series of ponds and earthen plugs

Beginning at the upstream end of the project, the first treatment type for the proposed action would restore channel floodplain connection and the meadow water table using a technique that is commonly referred to as "pond and plug." This technique would be applied to two reaches, one approximately 750 feet long at the upstream end of the project and the second reach (immediately downstream of the complete fill reach) approximately 400 feet long.

This first restoration technique consists of eliminating the stream channel incision by replacing it with a series of ponds and earthen plugs. The upper pond-and-plug reach would consist of series of 5 plugs and ponds and the lower reach would consist of 4 plugs. The design is based on functional fluvial geomorphic processes, and has been successfully implemented in numerous locations on the Plumas National Forest. The existing stream channel incision is alternately widened and filled, plugging the incision. As a result, stream flow is directed to remnant channels on the meadow surface and the valley floodplain is again connected to the stream channel. The widened areas of the old incision fill with groundwater, forming ponds. Shallow areas within the ponds can be particularly beneficial to wildlife, and are constructed to provide habitat. The downstream pond-and-plug reach would not be widened to generate plug material since meadow floodplain topography is such that wider pond areas would result in potential for flood flows from the west side of the meadow to flow over the cut and drop more than one foot into such ponds, creating a potential erosion hazard. Material for plugs at the downstream reach would be taken from the designated borrow site, shown in figure 7.

The plug elevations and widths would be designed to reduce the risk of head-cutting and surface erosion during major overland flows. To minimize the footprint of project activities, all heavy equipment would stay within the confines of the work area, and material transport generally does not exceed 300 feet. Widening the incision (forming groundwater pond areas) to generate plug material keeps restoration costs feasible by providing an alternative to costly import of soil and rock material to fill the incision completely. The total volume for the 9 earthen plugs proposed to be constructed is roughly 5,500 cubic yards, with all but 2,000 cubic yards being derived from nearby incision widening (ponded areas).

Completely fill a section of the channel incision

The second restoration technique proposed under Alternative 2, approximately 800 feet in length, would completely fill the channel incision and construct a small channel for the stream base flow. Transplanted sedge mats from the existing channel, as well as rock cross-vanes, would be used to stabilize the surface of the filled channel. A series of plugs and ponds is not feasible through this reach since the base flow channel cannot be located to a different location on the meadow surface. The meadow topography on the west side of the meadow tilts toward the current channel incision and the incision along this reach is located against a hillside on the east side of the meadow. Therefore, any stream channel restored to the surface of the meadow must flow in roughly the same area as the current incision. The incised channel through this reach is (on average) approximately 50 feet wide and 7 feet deep. Approximately 10,000 cubic yards of material would be necessary to fill this incision. Another 2,000 cubic yards of material would be necessary to construct the 4 plugs in the lower pond-and-plug reach.

To generate this material, two types of borrow areas would be excavated. The first is a cut within the meadow, just west of the upstream pond-and-plug reach. This area, approximately 0.8 acre, would be cut to a depth of about 3 feet (on average), generating approximately 4,000 cubic yards of material. The depth of this area would be about 1 foot higher than the water table that will result from the pond-and-plug reach, resulting in an area where vegetation rooting depth could access the water table most of the year. Topsoil in this area would be set aside during the excavation and then replaced in the area, creating a low meadow area that would hold a robust community of seasonally wet meadow vegetation.

The second type of borrow area would occur on the hill to the north of the restored meadow, along the access road to the meadow. This is a forested hill of mixed conifers. To generate the remaining approximately 8,000 cubic yards of fill material necessary to do the complete fill reach and to construct the 4 downstream plugs, areas on this hill would be excavated to average depths varying from 3-5 feet. The depth of cut would be tapered to existing hillslope topography to blend the cut into the landscape. Topsoil in these excavated areas would be set aside and then spread over the cut areas to retain soil organic matter in upper soil horizon. The excavated areas would be re-planted with mixed conifer species. Two potential borrow areas are identified in Figure 1, totaling 16 acres. The total area of excavation needed to generate the needed borrow material is much smaller, likely totaling about 2 acres. The identified areas are larger to allow for the needed excavation to be located in the areas where the best material is found to be available and where the excavation can be best fit into the hillside.

Figure 4: A small "raised riffle" rock structure constructed on Cottonwood Creek (Big Flat). A series of these structures is proposed for a less-incised reach of Thompson Creek to raise the water table in the meadow and spread flood flows onto the meadow surface.

Install raised riffle structures

The third restoration technique proposed under Alternative 2, approximately 700 feet in length, would also keep the stream channel in its current location. Floodplain function and water table restoration through this reach would be accomplished with a series of 7 rock "raised riffle" structures. Imported rock would be used to create structures that would raise the channel elevation to within 1.5 feet of the meadow surface, effectively restoring the water table and spreading large flood flows onto the meadow floodplain. The channel incision here is shallow, approximately 4 feet, so the volume of rock for each structure is not prohibitive (each structure would likely require about 150 to 200 cubic yards of imported rock).

Construct a grade control structure

The final restoration technique for the main stem of Thompson Creek would be construction of a rock "grade control structure" at the downstream terminus of the project. This armored structure is necessary to convey the stream flow down from meadow elevation into the incised channel outside of the project area. This structure would require large imported rock (up to 3 or 4 feet in diameter), whereas the 7 raised riffle structures on this reach could use smaller rock (2 feet maximum). The control structure would be approximately 8 feet high at its upstream end and would slope gently, dropping just 4 or 5 feet for every 100 feet of length. Step pools would be constructed within the grade control structure base channel to provide fish passage. The structure would be approximately 300 feet long, requiring up to 4,000 cubic yards of imported rock (from USFS's Crocker Pit), with rock diameters varying from a few inches up to 4 feet. To prevent end-run headcut channels, the grade control structure would be located at a rock outcrop area where the valley and meadow floodplain funnels flood flows over the hardened structure.

Figure 5: A rock grade control structure with step-pools on Last Chance Creek. Looking upstream. This type of structure is necessary at the downstream end of the project to convey stream flow, including large floods, down an armored surface and connect the restored channel elevation upstream with the untreated incised channel downstream.

Headcut control on tributary channel (including a rock apron)

Finally, several headcut channels exist at the southwest side of the meadow. These channels have formed due to ephemeral tributary flows across the west side of the meadow which then fall into the downcut Thompson Creek main stem. To treat these headcut channels, two rock raised riffle structures would be constructed within the main headcut channel to raise the channel elevation close to the meadow surface and match the water table elevation that would be established by the raised riffle structures in the Thompson Creek main stem. In fact, the furthest upstream Thompson Creek riffle structure would be extended laterally to treat one of the headcut channels and the tributary channel would enter Thompson Creek and flow over the two furthest downstream riffle structures. Additionally, one earth plug structure would be constructed to treat the furthest west headcut channel. Finally, a rock apron (2 foot rock diameter maximum) would be constructed at the upstream edge of the headcut network to convey tributary flows down a drop of about 2 feet to the elevation of the tributary raised riffles.

Plant willows

To provide soil stabilization, willow cuttings would be planted along pond and plug edges, and along the stream banks where the stream would remain in its current location. The raised water table in these areas would result in establishment of willow communities where the cuttings are planted. Large areas of sedge vegetation currently exist within the incised channel. These sedge communities would be excavated and transplanted along plug and pond edges and on the surface of the complete fill channel area to prevent soil erosion by providing a stable surface for concentrated flows.

Install fence

Within the Thompson Creek grazing allotment, approximately 6,500 feet of barbed wire fence would be constructed around the meadow restoration treatments to prevent cattle impacts while meadow vegetation recovers and becomes established. In the future (as soon as 3 years after project construction), cattle could be allowed within this grazing exclosure for short "flash grazing" periods, once District specialists have determined that meadow vegetation is firmly established. The approximate fence location is shown on Figure 7, although minor adjustments to this location could be made to improve the stability of the fence and facilitate future fence maintenance. Approximately 4 escape gates would be built into the fence to allow the grazing permittee to move stray cattle out of the exclosure. At the upstream end of the project, the fence would cross the Thompson Creek main stem near the downstream edge of the first plug. The surface of this plug would be armored with small rock (a mixture of rock with 6 inch diameter maximum) to prevent plug erosion when cattle cross Thompson Creek.

Access road improvement

The access road (0.8 mile long) to the meadow is currently too narrow for trucks to haul imported rock and the hillside borrow material to the construction site. The road would be widened to approximately 10 feet and rolling dip structures would be frequently installed to drain runoff from the road, preventing

rilling or rutting of the road surface. The road surface would be out-sloped (tilted away from the hillside at roughly 4 percent) to further disperse runoff from the road surface.

Mitigations

Aquatic Life Management

Prior to construction in each treatment area, water would be diverted around the treatment area to protect water quality and downstream aquatic life. Native fish would be removed from each work area, just after water diversion, using a backpack electro-shocker. The fish would be transported to the nearest area with adequate suitable habitat.

Re-vegetation

Vegetation that would be buried or continually submersed as a result of any of the action alternative treatments would be removed and re-planted at key points on treated areas such as filled headcuts, plugs, pond sides, or along the remnant channel where additional vegetation is needed. For pond-and-plug treatments, topsoil from the excavated areas would be removed, stockpiled, and later spread over the constructed plugs. Plugs would be seeded and mulched with locally collected native seed and weed-free hay. Pond margins would be planted with available sedge mats, willow cuttings, and native riparian grasses. Re-vegetation efforts would focus primarily in areas that need vegetative armoring or where implementation of the project has resulted in bare surfaces. It is expected that adequate re-vegetation in disturbed areas would take approximately three to five years. If post project monitoring reveals a need, planting and seeding would be repeated.

Noxious Weed Management

Botanical project analysis will include a noxious weed risk assessment. Standard Operating Procedures (SOPs) to avoid the spread of noxious weeds would be implemented. Specifically, all equipment would be washed at the contractor's yard to remove noxious weed seeds prior to being moved into the work area. Equipment would also be washed at the staging area to remove weeds prior to demobilizing from the project area. The project area would be monitored for noxious weeds invasion for three years after construction. Any weeds encountered would be hand-removed.

Grazing management

The proposed project area is partially located within the Thompson grazing allotments. Because of the scale of ground disturbance associated with this project, and the importance of vegetation in determining project success, grazing management is integral with project design, both post-project, as well as long-term.

The proposed action includes two to three years of rest from grazing immediately after project construction in the affected areas. The project areas would be rested from regular grazing for at least two to three years after construction to allow new vegetation to develop roots (areas affected by the project would still be used to move animals from one area to another). The affected areas would be monitored post-project with Annual Operating Instructions adjusted each year to facilitate a recovering trend. The

project Interdisciplinary Team (IDT) would determine when grazing may resume. Once grazing resumes, the project area would be monitored to ensure a continuing stable or improving vegetative and hydrologic trend.

Project Monitoring

This project is expected to benefit a myriad of resources by stabilizing the stream channels and restoring or enhancing the ecological function of the meadow and stream floodplain system. Hydrologic and climatic monitoring would include continuous measurement of: 1) stream flow and water temperature upstream and downstream of the project area (including a tributary to the meadow); 2) groundwater levels and temperatures for ten wells; 3) climate information at the Thompson Valley weather station (including continuously recorded temperature and precipitation); and 4) evapotranspiration during non-winter months. The five years of both pre- and post-project monitoring by CA-DWR would support a detailed evaluation of the surface water and groundwater effects of meadow restoration, including changes in quantity and timing of baseflow conditions and attenuation of flood flows. Environmental monitoring would facilitate the statistical comparison of pre- and post-restoration changes in fish and wildlife occurrence and abundance to determine if the project achieved its goal of improving fishery habitat, meadow productivity, and vegetative cover. Data collection would include ground cover composition, small mammal abundance, bird species density and diversity, and waterfowl use and production. Aquatic habitat monitoring would include fish movement through treated reaches, dissolved oxygen measurements, invasive species surveys, and stream channel condition inventory. As part of the Beckwourth Ranger District's long term grazing management, annual monitoring is expected to show trends in meadow health.

Decision to be Made

The responsible official would be the Beckwourth District Ranger. The responsible official will decide whether to implement the proposed action, implement the project based on a new alternative that is formulated to resolve identified issues, or not implement this project at this time.

Project Schedule

The responsible official expects to make a decision on this project in summer 2018, with implementation expected as early as 2019. In the year of implementation, construction is expected to occur during the low flow season, starting as early as mid-July, with completion expected no later than November.

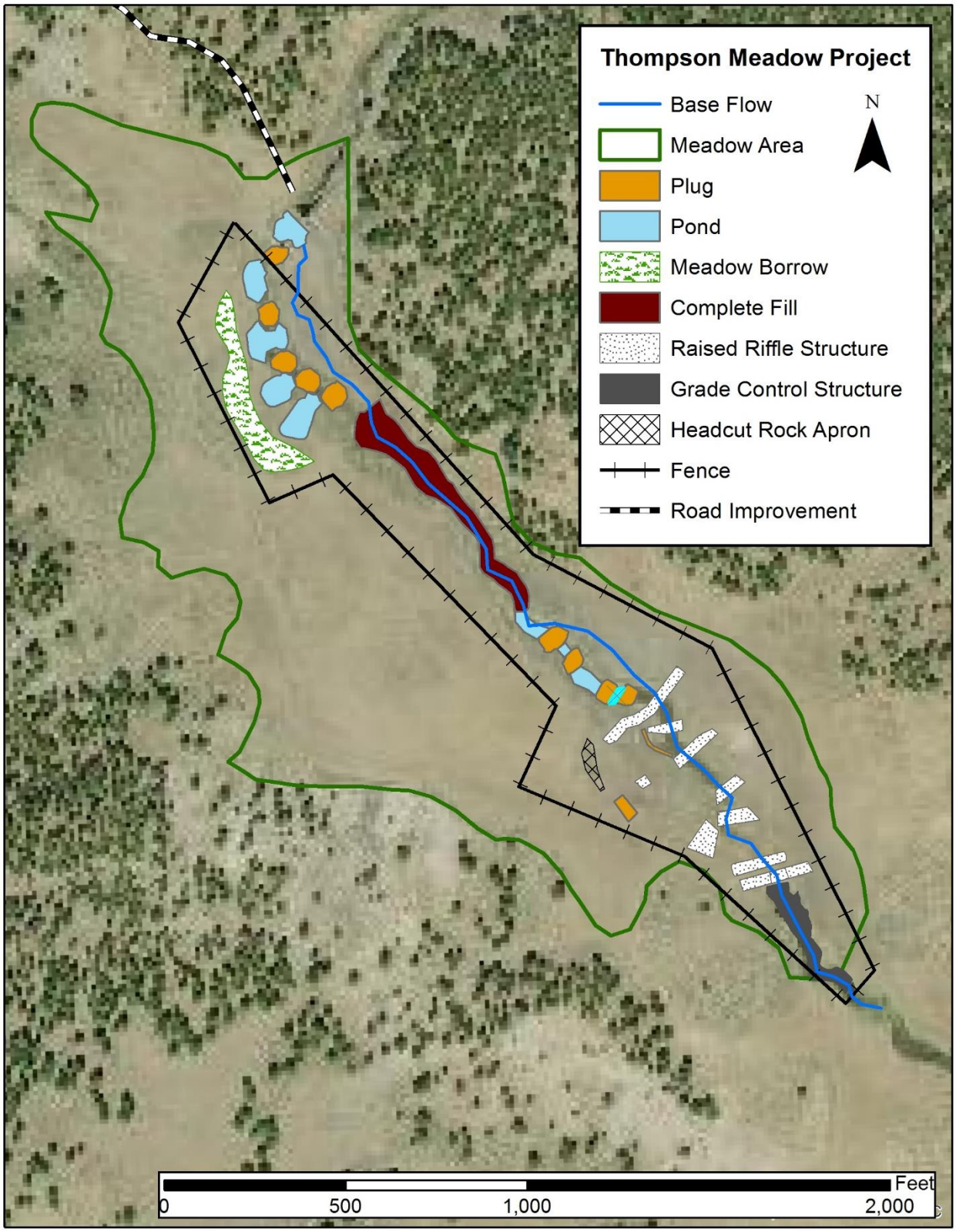

Figure 7: Proposed Meadow Restoration Treatments